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THE NETHERLANDS AND ITS WATERS: A MAJOR PROBLEM FOR A SMALL AND CROWDED NATION

*By Manfred C. Vernon**

The Netherlands, for many people, calls to mind the beauty of the tulip fields and the quaint charm of windmills. To envisage that country—ribboned by rivers and canals—as suffering heavily under the impact of environmental problems would counter most people's preconceptions. Yet the Netherlands is a nation that can be described as overpopulated and as committed to industrialization and urbanization, with all the attendant ecological distress.

Significantly, the Netherlands is the world's most densely populated nation. More than 13 million people inhabit an area of nearly 13,000 square miles (a population distribution of about 1000 people per square mile). The population has grown and will continue to grow quickly: it totalled 7,832,000 in 1930, and its present population of 13 million is expected to grow to 15 million by 1980 and 20 million by the turn of the century.[1] The growth in population has been accompanied by a significant rise in the national standard of living. At the same time, however, the Netherlands has become one of Europe's leaders in matters of environmental preservation, reorientation, and improvement. Its civic and governmental initiative with respect to such matters, as well as its dedicated participation in international approaches to protect the human environment, cannot be overlooked; indeed it may be safely expected that this nation will be in the vanguard of any international movement toward a vital global environment.

Throughout the years there have been official pronouncements as respects environmental control and protection. Yet, as in the United States, awareness of man's rapid move toward self-destruction is of recent vintage. On the occasion of an environmental control seminar, sponsored by the United States Embassy to the

Netherlands, Dutch Secretary of State de Koster described the situation as follows:

> Only recently, here in Holland in the sixties, did people begin to recognize the importance of such "trivial" matters as clean air and clean water, and the need for more recreational facilities and better living conditions in general. Basic material needs were increasingly satisfied, and consumer preferences moved on to "higher" levels—in more than one sense. Even more important, there has been an increasing awareness that ultimately our very survival is at stake. Our society awakened to the fact that our environmental assets were becoming scarce and were therefore becoming ever more valuable. Man became aware that he was not situated above, or outside nature; he was part of it.[2]

Much has been done to enable the population to recognize the need for rapid action; the press, radio, and T.V. (in outstanding programs) are constantly bringing environmental problems to the attention of the populace. Political spokesmen and public figures have been enlisted in the process of continually reminding the nation of the severity of the problem. The royal family has assumed a role of leadership and has participated in numerous meetings and public appearances to register its concern with the general conditions. Prince Claus, the husband of Crown Princess Beatrix, appeared on a television program last year as an advocate of environmental reform. His observations were presented in a series of five nation-wide television shows, which ran from October 1970 until December 1971. The series was entitled *We Stinken Er In* (freely translated: We are trapped into it). It depicted the impact of pollution on the Netherlands and on other countries as well; it included interviews with famous scientists and academicians from several nations (the United States, for example, was represented by such persons as Paul Ehrlich, Daniel Moynihan, and Barry Commoner). The reaction to these broadcasts was extensive and positive; they were thoroughly covered by all of the country's newspapers and magazines, and were given overwhelming approval in the numerous letters sent to the producer and the broadcasting network. All programs have been or will be converted into book form to be published under the title of the program.[3]

A number of recreational and civic organizations, instituted only in the last few years, have dedicated themselves to such specific environmental problems as water, soil, air, or noise pollution; noise

pollution, for example, has stirred several associations to protest the planned expansions of various Dutch airports. Institutions of higher learning, such as the Technical University of Delft and the University of Tilburg, spend much time and effort on a variety of ecological questions, particularly in connection with the control of water and the air.[4]

The rapid urbanization and industrialization of the country following World War II and the collapse of the Dutch colonial empire created a need for economic reorientation. The country's woes were compounded, moreover by the 1953 sea catastrophe, when the sea flooded the land and caused 1835 people to die and one billion guilders of damage to eventuate. The war itself had ended with the country being close to complete ruin; German occupation and general destruction had left extensive damage, reducing Dutch national wealth by almost 30 percent. In the ensuing recovery and rebuilding of the country, its economy shifted much of the working population to industry and to urban centers. Although the shift brought about labor shortages, it also significantly increased the nation's export market, thereby permitting a tremendous rise in the national income.[5]

Geographical growth of the nation was made possible by the reclamation of land from the sea (started in the period between the two world wars) in the Zuyder Sea area and in the low-lying areas of the Province of Zeeland that had been hit in the 1953 catastrophe.[6] The latter reclamation project, known as the Delta Project, was initiated principally to ensure greater security for the island and delta region between the Rhine estuary and the Scheldt estuary. It established superior protection against inundation from storm tides. Yet a second consequence of this sealing-off of sea inlets has been the reduction of salt water penetration into the country. On the landward side of the dams, reservoirs of predominantly fresh water, known as Delta Lakes, are to be formed; the purpose of these lakes is not so much to develop new sources for domestic water needs as it is to provide open-air recreational areas.[7] In comparison, the principal purpose of the Zuyder Sea project has been to create a fresh-water reservoir and to make possible additional reclamation of land.[8]

The steadily growing population and the material economic changes wrought by the war and natural catastrophe have made the Dutch keenly sensitive of the need to protect and develop their fresh-water sources. In this regard, some of their recently formu-

lated precepts have been expressed in detail in a report prepared by the Dutch Government for the Stockholm United Nations Conference on the Human Environment in June, 1972. The report emphasizes:

(a) the unique geographic and economic position of the Netherlands for transport and trade in North-Western Europe, i.e., its position in the deltas of the large rivers, the Rhine, Meuse, Scheldt and Ems, which flow through the most densely populated and highly urbanized and industrialized regions of Europe; also its position on the busy, ice-free North Sea.

(b) the special hydrological and hydrographic position of the country due to its artificially low situation in relation to sea level and the water level of the rivers. Sea and river dikes protect more than half of the territory of the country, including the very densely populated Western region, from flooding, which would render them uninhabitable.

(c) the demographic position—with a population of about 13 millions occupying a very small area . . . the Netherlands is, despite its vulnerability, one of the most densely populated countries in the world.[9]

It impresses the observer that the report characterizes the Netherlands' relationship with water as a "*struggle against* water, the water of the sea and the large rivers;" the report further notes that water has left "its mark on several aspects of the social scene." Summarizing, the report states:

> The Netherlands owes its high level of economic development to its situation on the estuaries of the Rhine, the Meuse and the Scheldt, major international shipping lanes between the North Sea and the European hinterland, even though the estuaries of these rivers, and the possibility of flooding have been an ever-present danger.[10]

The country worries particularly about the condition of its great rivers. Although the rivers are the main source of fresh water, the quality of river water has steadily deteriorated because of the tremendous volume of commercial traffic as well as the never-ending stream of industrial and domestic effluents. It must be recognized that the Rhine River is the principal source of drinking water for the country. Dutch officials concerned with aspects of water control have described the pollution of the great rivers in the Netherlands, and particularly that of the Rhine, as a scandal of the first magnitude. On the occasion of a conference of the International Commis-

sion for the Protection of the Rhine in June 1971, in Luxembourg, the Dutch delegation vigorously protested against the dumping of heavy metals, phosphorous, and biochemical matter, all of which are damaging or poisonous for various forms of river life. It was pointed out that the Rhine during 1970 carried with it at its point of entry into Holland the following quantities of metallic matter:

85 tons of mercury
1,000 tons of arsenic
200 tons of cadmium
1,500 tons of lead
2,900 tons of copper
9,000 tons of zinc and
200 tons of chromium.[11]

An American observer has succinctly described the serious water pollution endured by the Dutch: "They prosper from the world's largest seaport, Rotterdam, but take the dreadfully polluted Rhine River with it."[12] Not that the Rhine was a clean river in former times. It must be a revelation for many that the river was disparaged in 1828 by Samuel Taylor Coleridge in a poem about the city of Cologne:

> The river Rhine, it is well known,
> does wash your City of Cologne;
> but tell me, Nymphs, what power divine
> shall henceforth wash the river Rhine?

As a consequence of its passing through heavily populated and industrialized areas, particularly in Germany, the river has become known as the 'drainage channel' for Western Europe.[13]

Significant changes in the quality of fresh water have taken place not only with respect to rivers and other surface water but also with respect to groundwater. Both ground and surface water are increasingly subjected to salinification. One of the reasons for the saline influx is the sea water's entering through the open Rhine, Meuse, and Scheldt estuaries; another is that the Rhine River itself carries a high salt load, particularly at the point of which it enters the Netherlands.[14] While formerly the salinity of the river was only of little significance, its salt content now "has increased to such a degree that it presents a serious threat to the whole fresh water supply of the Netherlands and thus to the very life of the country."[15] The rectification of this development is of the utmost ur-

gency, since it "has occasioned through the years a disturbing deterioration in the quality of this river."[16] Moreover, the river water becomes even less tolerable within the country because of the addition thereto of salt used in winter to clear roads of ice, salt discharged in effluents, and salt wastes from agricultural activity.

The need for water is of course steadily increasing. It is anticipated that by the year 2000 the average daily consumption of water will be twice the amount consumed today. At least four times as much fresh water will be needed for the cleaning up, flushing out, and diluting of surface water.[17] Since water is going to be used also for conservation and recreational purposes and for the cooling of new thermal and nuclear power stations, one cannot help but conclude that Holland's most pressing environmental problem is the qualitative and quantitative control of ground and surface water.[18]

Matters are complicated by the fact that nearly one-fourth of the country lies below the mean sea level, and in certain extreme instances as much as 20 to 25 feet below. The potential problems, moreover, are overwhelming: more than half of the total needed water would contribute to periodic flooding were it not for an intricate system of dikes that protects the land from high sea tides and flooding rivers. The control of the water table as well as the draining of the low-lying lands, from which the water cannot run into the sea, is handled by an accumulation of ditches, canals, and trenches, into which excess water is often pumped. In turn, from such waterways and lakes, the water is finally pumped into the rivers and the sea.[19]

Water resources located on higher levels are also often exposed to salinification, which is caused by the sea water's entering either through the open estuaries of the rivers or through the large shipping locks of seaports. Salinated and brackish groundwater may also reach these resources, and quite often such intruding waters have a salinity content equal to that of the sea.

Perhaps one of the greatest problems regarding the planning of sufficient and high-quality water resources lies in the limitation of existing groundwater resources. Some of those resources can be found in the dunes in the western part of the nation, where having been replenished by channeling filtered and chemically treated river water they enter the dune storage reservoirs.[20] While the Rhine has been (and must be expected to remain) the predominant source of such water (approximately 85 percent), the importance of the Meuse is growing, particularly since "the Netherlands, by

the year 2000, will be using seven times more surface water than at present."[21] But while the water quality of the Meuse has seemingly been much better than that of the Rhine, it is also expected that it will never fully match the Rhine's significance, since, the Meuse, being a river exclusively fed by rain water, can be of virtually no aid in dry spells. As to flow and quality, both the Rhine and the Meuse, flowing through heavily industrialized regions, vary considerably throughout the year. It is thus imperative that whenever relatively good water is available from either source that sufficient quantities be stored to ensure the national supply.[22]

> [I]t must be remembered that any increase in the pollution of these rivers will add to the risks of infectious disease. This is important if we consider that in future there will be an increasing use of surface water for drinking water. At the present time [1962] about 70 percent of groundwater and 30 percent of surface water are used, but groundwater reserves are not sufficient to meet the increasing requirements and a reversal of these percentages may be expected, therefore, in the next few decades.[23]

Several legislative provisions have been initiated to deal with water quality and supply. The Groundwater Act for Water Supply Undertakings of 1954, introduced the concept of the permit; the permit was to be given by the Ministry of Social Affairs and Public Health prior to developing groundwater for new supplies or for the expansion of existing supplies. Another law was the more general Water Supply Act of 1957; it was concerned with the supervision of water works for reasons of protecting public health. It also provided for a special Council for Water Supply, which Council was to consist of representatives from all levels of government.[24] While other enactments followed, the most important law as to the regulation of water was the Surface Water Pollution Act of November 13, 1969 (effective as of December 1, 1970). Its principal concern is the control of surface water, including rivers, canals, lakes, ponds, as well as parts of the sea. The law provides for a transition period of four years during which national reorganization of water control is to be effectuated. Furthermore, it replaces several existing laws, which while dealing with matters of drainage and "general nuisance" did not guarantee general water quality control.[25]

The outstanding contribution of this act is that it orders the polluter to pay ("de vervuiler betaalt"). While imposing a general prohibition on the discharge of polluted water, the law does grant

exemptions under specific conditions, for which exemption the grantee must pay a fee. The size of the fee is determined by the quantity and the polluting capacity (oxidizing capacity) of the effluent. Any money derived from such payments will be used for the financing of regional anti-pollution measures and, in particular, for the construction of sewage plants. As a result, municipalities that release sewage and other pollutants into waters such as rivers, ponds, or canals, must pay a per capita levy, as must industries that discharge waste water.[26] The enforcement of the law on the national level is assigned to several ministries (e.g., the Ministry of Transport, Public Works and Water Control, and the Ministry of Social Affairs and Public Health). Simultaneously, local officials have been given authority to enforce this law in their respective provinces.[27] The new law also contains a provision that every five years the Minister of Transport, Public Works and Water Control shall develop further programs for water pollution control.

While significant progress has thus been made in the field of surface water pollution, much still remains to be done in the field of efficient groundwater control. Although new legislation for a general Ground Water Law is being prepared with a view to the general quantitative management of groundwater, it is by no means clear whether there exists a clear overall inventory of subterranean water deposits. One law regulating water supplies from groundwater sources is the Ground Water Act for Water-Supply Companies, which concerns itself exclusively with the extraction of water for public water supplies. Some of the Dutch provinces already have administrative rules in force regarding groundwater, but they deal mainly with matters of compulsory registration or licensing of water extraction for industry. In the case of groundwater extraction for public drinking water supplies, there exist protected areas within which no buildings may be erected, and other areas of a still wider range within which no building, industrial treatment plants, sanatoria, or camps may be situated. In none of the protected areas may there be dumping or discharge of solid or liquid waste.[28] Yet all this may be considered only a beginning, since there has not been sufficient work done in connection with the permanent sources of pollution, such as cesspools, dung hills, leaky sewer systems, and refuse dumps. The soil contamination from these sources is so extensive that it reaches the groundwater. Clearly, where public water supplies may be affected, such contamination cannot be tolerated. Accordingly, the country is concert-

ing its efforts as to the pollution of ground water sources in a way that seeks to avoid future contamination of the soil by chemical materials. It is also attempting to find means to bring under control the methods of processing the growing quantities of solid waste, including the sludge from sewage plants.[29]

As a result of previous years' work, with respect to which considerable initiative was displayed at the local level, the Netherlands had, by the beginning of 1970, more than 440 municipal sewage treatment plants. These plants treat, in terms of population equivalent (P.E.), 7 million of the 43 to 48 million units of domestic and industrial organic effluents produced. Fifty-eight plants now under construction will be serving another 4 million P.E. It should be noted that at least another four million P.E. are carried off to the North Sea or its arms. It is also important to recognize that most of the nation's large cities are situated either along the major rivers or near the coast and that their sewage is still discharged in several instances without treatment by any sewage plant.[30] The *National Report* states, pessimistically:

> In all, some 37 million [P.E.] of domestic and industrial effluents are discharged untreated into fresh open waters. To this we should also add the contamination of the surface water with overflow water from the mixed sewage system and with some 3 million P.E. of effluents from the growing intensive livestock-rearing industry. There are no definite figures for the treatment—insofar as this occurs—of inorganic industrial wastes. Generally speaking, policy in the Netherlands is aimed at siting industries which discharge large quantities of inorganic effluents near the coast or on one of the estuaries.[31]

Most of the existing sewage treatment plants are of moderate size (500 to 5000 P.E.). The majority is of the sedimentation and/or oxidation type.[32] They do not retain nitrogen or phosphorus, nor do they disinfect the effluent. Dutch experts and other observers believe that, principally for reasons of economy, inordinate reliance has been accorded to the self-purifying capacity of surface water in the Netherlands, as far as sewage treatment and free discharge of effluents are concerned.

The increasing discharge of untreated (or insufficiently treated) effluent has harmed not only the country's fresh water resources but also the coastal water of the North Sea. It is unlikely that the self-purifying capacity of these waters and estuaries is adequate to absorb such considerable quantities of effluents. This inadequacy will

become an increasingly critical concern for the Netherlands. Already it is feared that the discharge of nearly 30 P.E. of such untreated effluents into these waters not only will lead to the pollution of sea water and tourist beaches but also will increase the probability of damage to such unique international nature areas as the Waddensee and the Ems-Dollard estuary.[33] (The latter is an area of frontier waters shared with the Federal Republic of Germany.) While at one time chemical wastes were dumped into the Rhine, tighter controls on such actions have led to an egregious increase in dumping directly into North Sea waters, especially those immediately off the Dutch coast. More than half a million tons of acid and alkaline waste were reported to have been poured into the sea during 1970. Dutch authorities at first appeared to disregard these activities—evidently on the hope that a natural consequence of increased sea dumping would be an improvement in the condition of the Rhine. Yet it has been observed that the river still remains a major pollution problem.[34] As to the sea, the damage done to the flora and fauna has become alarming. A broadcast by van Hillo, who produced the television series *We Stinken Er In*, alerted a nation-wide audience to the fact that many seals in the Waddensea were being killed because they were ingesting fish that were increasingly contaminated by mercury.[35] Of course, it was mainly the Rhine that had so contaminated these fish. The dumping of poisonous matter into the river, moreover, not only had contaminated the fish but also had killed them in catastrophic proportions. While the fish poisonings of the early summer of 1969 gained considerable international notoriety, there have since been other deadly episodes, for instance, in May of 1971, when thousands of fish were found dead along the Rhine in the Netherlands.[36] It has been pointed out that the mercury pollution of the Rhine is one of the factors that make the environmental pollution from mercury in the Netherlands amongst the worst in the world. However, mercury alone cannot be blamed. The river's heavy content of nitrogen and phosphorous is also extremely deleterious to the fish, since it contributes to eutrophication of surface waters in the Netherlands.[37]

Much of the Netherlands' surface water is also threatened because of its receipt of rapidly increasing amounts of industrial hot water. The growing demand for electric power may be expected to spur construction of thermal and nuclear power stations; increasing amounts of water will be needed for operational cooling purposes. However, the utilized waters themselves will be warmed by

the processes and, on their return to their sources, they may increase the overall water temperature thereabouts. Thus it is critical that there be exploration of the possibility of artificially cooling these waters and of making them again available for further cooling uses. Otherwise, the ecological consequences of any thermal pollution might be severe indeed.[38]

It is significant that the Netherlands' nationally scaled surface-water anti-pollution law is only of very recent origin. As late as 1967, a study by the World Health Organization could still introduce its chapter on the control of water pollution in the Netherlands by stating:

> The absence of any legislation at the national level on water pollution makes the position in the Netherlands rather unusual. Although there are also a number of other countries in which legal means for the effective control of pollution do not exist, the position in the Netherlands is made more difficult by factors such as the high population density, the high degree of industrialization and in particular by the fact that the major rivers which cross the country have already been polluted to a considerable extent upstream.[39]

Notwithstanding the fact that such protective laws were only recently enacted, Dutch authorities have attended to water protection for a rather long time. Earlier laws, although not framed as specifically as their successors, did permit a measure of pollution control to be exercised by central authorities. For instance, matters of industrial pollution were handled by the Nuisance Law (Hinderwet) of 1952, which prohibited

> the unauthorized installation, starting up, extension or modification of installations likely to cause danger, damage, or a nuisance outside the establishment concerned.

Other laws, such as the Housing Law, included provisions protective of groundwater and prohibitive of construction that was likely to adversely affect the quality of such water. There existed, and exist today, local authorities empowered to ensure general protection of the water. The purification of river water and the maintenance and improvement of river beds and banks were the concern of the polder districts, which, as all local authorities, had considerable administrative powers. The provincial governments could, moreover, issue mandatory regulations to prohibit the discharge of pollutants.

While it therefore may be said that pollution of water has been a concern for the Dutch for many years, some difficulties did arise previously because of a lack of coordination of responsibility among the various levels of authority. National efforts at control date to the last century. As early as 1897 a special commission was appointed by the Minister of the Interior to find a solution for the national control of pollution. Although these specific proposals were not then adopted,[40] they evidenced an early sensitivity to pollution matters and had some precedential significance for later, more successful efforts.

For many years there has existed a Government Institute for Waste Water Treatment (RIZA). Indeed, long before the agency's founding by royal decree in 1920, governmental health inspectors in 1873 had expressed alarm over water pollution. Their calling attention to the problem subsequently persuaded Parliament to install control commissions. Today with respect to waste water treatment, much trouble follows from agriculturally related activities, such as the preparation of potato flour or the discharge of various agricultural by-products. While the outstanding concern of RIZA has been the cleaning of waste water, it has additionally dealt with the more general problems associated with surface water; this additional activity of RIZA is coordinated by a special branch therein, which was established in 1963. Research has been undertaken not only with respect to waters' receipt of effluents, but also with respect to the impact of such receipt on recreational activities. Studies have been conducted, for example, of swimming beaches along the North Sea, particularly between the Hoek van Holland and Scheveningen and also at Vlissingen and Ijmuiden.[41]

Another older government agency that has also dealt with water is the Government Institute for Drinking Water Supply (Rijksinstituut voor Drinkwatervoorziening), formed in 1913. The Institute remains viable today. Its close cordination with local authorities has led to the creation of regional water boards.[42]

Since the condition of the water quality in the Netherlands is ultimately dependent on international cooperation (as much of the nation's water pollution has its origin beyond its national boundaries) it seems clear that the various affected riparian countries must not delay in framing a coordinated response to their collective problem. In the case of the Rhine and its tributaries, an International Commission for the Protection of the River Rhine against Pollution was constituted in 1950 and remains intact today. Par-

ticipants are Switzerland, France, Luxembourg, the Federal Republic of Germany, and the Netherlands. It has developed a system which coordinates the testing of water quality across national lines. In 1965 a treaty was accepted by the participating nations, providing for the establishment of a permanent Secretariat, at Koblenz, Germany.[43] Most of the discussions in the Commission have dealt with matters of salt contamination of the Rhine and the need for waste retention by the potash mines in Alsace. Another development has been the implementation of a warning system by which the Rhine may be protected from excessive poisoning.[44] Nevertheless, while it has been technically possible to reduce the contamination of the river, no effective agreement concerning measures to improve the quality of the Rhine has thus far been concluded between the member states.

The Netherlands is a partner to regulations dealing with the prevention of pollution of international rivers from radioactive wastes. One such regulatory instrument is the 1957 Treaty establishing the European Atomic Energy Community (EURATOM). Each of the partners, the Benelux nations as well as Germany, France, and Italy, is under obligation to check constantly on radioactivity of the water and to report on its findings to the community.[45]

The question of the purity of water has drawn the Netherlands into many other negotiations and organizational activities. In addition to the affiliation with the European Community, the Netherlands is actively involved in such organizations as the Council of Europe (and its European Water Charter), the Organization for Economic Cooperation and Development (OECD), and the Economic Commission for Europe (ECE) (within the framework of the United Nations Economic and Social Council). There is also affiliation with such specialized agencies as UNESCO, WHO, and WMO. The Dutch RIZA has been designated by WHO as an "International Reference Center on Community Water Supply," with the assigned task to encourage and coordinate research and development in the field of drinking water sources; this work is to be supported by "collaborating institutions."[46] For a number of years the country has made its contributions to ECE and submitted to the organization generic and detailed observations on water pollution. In this regard, some of the major contributions have been: "Identification of the Most Urgent Water Pollution Problems," "Possibilities for International Action" (concerning the effective

use of water and adequate treatment of waste),[47] and "Protection of Ground and Surface Waters against Pollution by Crude Oil and Oil Products."[48]

At the international level, the Netherlands has become a vigorous proponent of "effective forms of bilateral and multilateral cooperation with regard to such questions as water management."[49] It has taken an active role in the United Nations, the European Community, and the OECD, as well as in Benelux and the North Atlantic Treaty Organization. It is within this vast array and interplay of international organizations that the Netherlands will have to find many of the theoretical solutions to the problems of water quality maintenance for its people. Full implementation of any such solutions, however, is perhaps yet the most difficult task facing the Netherlands.[50]

FOOTNOTES

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[1] CIRCUIT, pp. 3–8 (July 30, 1970).

[2] Opening Remarks at the Environmental Control Seminar at Rotterdam (mimeographed) (May 25, 1971).

[3] J. van Hillo, Wolf Kielich, *We stinken er in* (Bussum: Van Holkeman & Warendorff, 1971) in five parts with the first one using the subtitle "A snapshot of our life on top of a volcano." The author of this article was briefly interviewed on the occasion of the fifth and final broadcast.

[4] For instance, an international colloquium on "Electrical Energy Needs and Environmental Problems," was held in Eindhoven in June 1971, under the guidance of the John F. Kennedy Institute Center for International Studies in cooperation with the Centers for Science, Technology and Public Policy of the Universities of Eindhoven and Tilburg and also the Foundation for the Future Shape of Technology of the Dutch Royal Society of Engineers.

[5] For more detail, see M. C. Vernon, "Background of Netherlands Foreign Policy," in CONTROL OF FOREIGN RELATIONS IN MODERN NATIONS, p. 555 (P. W. Buck and M. W. Trevis, Jr. (eds.), W. W. Norton & Co., New York, 1957). It might be also noteworthy that about 100,000 laborers came from a number of European countries such as Greece, Spain, Yugoslavia and others as well as from Turkey.

[6] CIRCUIT, p. 3 (July 30, 1970). It is unfortunate that this fine publica-

tion (announced as a "link between friends of the Netherlands throughout the world") had to be discontinued after this, its thirtieth issue.

[7] See, "United Nations Conference on the Human Environment, Stockholm, June 1972" PROBLEMS OF THE HUMAN ENVIRONMENT IN THE NETHERLANDS: A NATIONAL REPORT (mimeographed report—F/4107/71, p. 39) (hereinafter referred to as NATIONAL REPORT). It is the counterpart to the U.S. NATIONAL REPORT ON THE HUMAN ENVIRONMENT prepared by the Department of State (Department of State Publication 8588, released June, 1971).

[8] *Id.* at 41.

[9] *Id.* at 5.

[10] *Id.*

[11] Algemeen Dagblad (Rotterdam), June 10, 1971. The article in the newspaper also points out that at this time one-third of the drinking water used by the country comes from the Rhine, and it is expected to satisfy two-thirds of the country's drinking water needs from the river by the end of this century.

[12] N. Thimmesch, "Holland's Water Problems," Seattle Times (July 19, 1971).

[13] U. Schweinfurth, "Environment and the Tasks for Foreign Policy," in AUSSENPOLITIK (German Foreign Affairs Review) 22:2, p. 142 (1971).

[14] NATIONAL REPORT, *supra* note 7 at 11.

[15] *Id.* at 12. Much of the salinity has been caused by the discharge of water salts from the potash mines in Alsace (France) and has been increased by effluents from a number of industrial sources along the Rhine and the coal mines of the Ruhr district. It is estimated that the natural salinity of the Rhine and its tributaries amounts to about 100 pounds of chloride ions per second. *Id.* at 22.

[16] *Id.* at 22.

[17] *Id.* at 14.

[18] *Id.* at 8.

[19] The NATIONAL REPORT also points out that the sea level is rising while the low-lying parts of the country are sinking by about 4–8 inches per century.

[20] While today's water for cities such as Amsterdam and the Hague is obtained from the dunes, Rotterdam (since 1874) has drawn its drinking water from the Rhine. As early as 1940 the General Commission for Water Supply has stated that future water needs, especially for Western Holland, had to be met increasingly by surface water. Thus, the dunes containing the water for Amsterdam, the Hague and other places have received additional and specially treated surface water from the Rhine, in some instances 50 kilometres away. See ENVIRONMENTAL HEALTH IN THE NETHERLANDS p. 16 (The Hague: Ministry of Social Affairs and Public Health, 2d ed., 1971).

[21] NATIONAL REPORT, *supra* note 7 at 16.

[22] ENVIRONMENTAL HEALTH IN THE NETHERLANDS, *supra* note 20 at 18. Such storage would take place in special basins to hold reserves of river water both on the surface and in the ground. NATIONAL REFORT, *supra* note 7 at 45.

[23] As quoted in World Health Organization, CONTROL OF WATER POLLUTION: A SURVEY OF EXISTING LEGISLATION, p. 84 (Geneva, 1967).

[24] ENVIRONMENTAL HEALTH IN THE NETHERLANDS, *supra* note 20 at 19.

[25] The text in Dutch can be found in a publication of the Royal Netherlands Tourist Organization (ANWB): F. E. Sanson, ONS WELZIJN EN DE WATERVERVUILING (Our Welfare and Water Pollution) (The Hague, 1970).

[26] N. Thimesch, *supra* note 12. See also the publication of the Ministry for Transportation and Water State, DE VERVUILER BETAALT (The Hague, 1971).

[27] NATIONAL REPORT, *supra* note 7 at 55.

[28] *Id.* at 48.

[29] *Id.* at 52.

[30] K. C. Zijlstra, "Water Pollution in the Netherlands," a mimeographed paper read before the Environmental Control Seminar, Rotterdam p. 3 (May 25–26, 1971). There are also special sewage plants for institutions, military installations, etc.

[31] NATIONAL REPORT, *supra* note 7 at 48.

[32] A. C. Zijlstra, *supra* note 30 at 4.

[33] NATIONAL REPORT, *supra* note 7 at 51.

[34] International Herald Tribune (May 5, 1971).

[35] J. van Hillo-Kielich, *supra* note 3 at 20. Much of the fish of that area allegedly contains much mercury.

[36] Algemeen Dagblad (Rotterdam) (May 21, 1971).

[37] NATIONAL REPORT, *supra* note 7 at 18.

[38] *Id.* at 19.

[39] *Id.* at 83.

[40] *Id.* at 85.

[41] For detail see R. voor Zuivering van Afvalwater, 50 Jaar Zuivering Van Afvalwater (The Hague, 1970), passim. See also ENVIRONMENTAL HEALTH IN THE NETHERLANDS, *supra* note 20 at 22.

[42] ENVIRONMENTAL HEALTH IN THE NETHERLANDS, *supra* note 20 at 16.

[43] *Id.* at 26. RIZA analyzes the water in question within the Netherlands for the International Commission.

[44] NATIONAL REPORT, *supra* note 7 at 79.

[45] *Id.*

[46] *Id.* at 80.

[47] Conference on Water Pollution Problems in Europe. Documents Submitted to the Conference, United Nations, Geneva, #61.II.E/Mim 24, Vol. I, p. 139, Vol. III, p. 574 (1961).

[48] For details see the Proceedings of the Seminar on the Protection of Ground and Surface Waters Against Pollution by Crude Oil and Oil Products, Geneva, Dec. 1–5, 1969 (United Nations, New York, 1970) Vol. 1, p. 56, and Vol. 2, pp. 221, 289. Some of the statements submitted were prepared by spokesmen of CONCAWE (Association for Conservation of Clean Air and Water for Western Europe) which has been created as a research organization by the joint oil refineries in England and Western Europe; its headquarters is located in the Hague. It has initiated a number of studies dealing with water and air pollution with such titles as "Recent Results of Methods for Combatting Acute Oil Pollution of the Sea and Coastal Waters" (Report Nr. 28/70 by Hans-Joachim Marcinowski (The Hague, Nov. 1970), and many others.

[49] State Secretary for Foreign Affairs, H. J. de Koster, "The Cooperative Effort to Overcome Environmental Problems," p. 5 (Opening Remarks at the Environmental Control Seminar, at Rotterdam (mimeographed) May 25–26, 1971).

[50] There are a variety of opinions in the Netherlands as to the ultimate seat of control of environmental problems and necessary action. Much has to do with the emphasis of environmental concern, i.e., whether it is a matter of public health, of economic planning, or of the general direction of a nation towards its future. As a result, there can be observed in the country groups that favor one or the other of these approaches. It is also a matter of the financing of environmental protection that concerns many; it has been estimated that the annual cost for the fight against pollution of water, air and soil will be one billion guilders for the next years to come. See De Nederlandse Onderneming (Sept. 11, 1970). The Ministry of Economics has established a special group dealing with a macro-economic analysis of environmental control. Another organization is the Central Planning Office of the Netherlands; it has looked into organizational and fiscal problems of environment. These are just a few examples of endeavors outside the regular agencies that have dealt with specific issues of environment. Last, but not least, it must be appreciated by the onlooker that much will have to be done on the level of interplay between central and local governments and that there exists the possibility of conflict arising between new institutions and established "vested interests." It is certainly hoped that the common awareness of the seriousness of the environmental condition will furnish the incentive for successful handling of the question.